

SEQUENCE LISTING

<110> Allen, Stephen M.
Rafalski, J. Antoni
Sakai, Hajime

<120> Nitrogen Transport Metabolism

<130> BB-1210

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<150> 60/098,248

<151> 28 August 1998

<160> 14

<170> Microsoft Office 97

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<211> 1037

<212> DNA

<213> Zea mays

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<212> PRT

<213> Zea mays

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Ala Ala Val Ile Cys Gly Phe Val Ser Ala Trp Val Leu Ile Gly Ala
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Asn Ala Leu Ala Ala Arg Phe Arg Phe Asp Asp Pro Leu Glu Ala Ala
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Gln Leu His Gly Gly Cys Gly Ala Trp Gly Val Leu Phe Thr Gly Leu
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Phe Ala Arg Arg Lys Tyr Val Glu Glu Ile Tyr Gly Ala Gly Arg Pro
65 70 75 80

Tyr Gly Leu Phe Met Gly Gly Gly Gly Lys Leu Leu Ala Ala Gln Ile
85 90 95

Ile Gln Ile Leu Val Ile Ala Gly Trp Val Ser Cys Thr Met Gly Pro
100 105 110

Leu Phe Tyr Ala Leu Lys Lys Leu Gly Leu Leu Arg Ile Ser Ala Asp
115 120 125

Asp Glu Met Ser Gly Met Asp Leu Thr Arg His Gly Gly Phe Ala Tyr
130 135 140

Val Tyr His Asp Glu Asp Pro Gly Asp Lys Ala Gly Val Gly Gly Phe
145 150 155 160

Met Leu Lys Ser Ala Gln Asn Arg Val Glu Pro Ala Ala Ala Val Ala
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Ala Ala Thr Ser Ser Gln Val
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<212> DNA
<213> Glycine max

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<210> 4
 <211> 500
 <212> PRT
 <213> Glycine max

<400> 4

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Phe Ala Ala Val Asp Ser Lys Phe Val Asp Thr Ala Phe Ala Val Asp
          35           40           45

Asn Thr Tyr Leu Leu Phe Ser Ala Tyr Leu Val Phe Ser Met Gln Leu
          50           55           60

Gly Phe Ala Met Leu Cys Ala Gly Ser Val Arg Ala Lys Asn Thr Met
          65           70           75           80

Asn Ile Met Leu Thr Asn Val Leu Asp Ala Ala Ala Gly Gly Leu Phe
          85           90           95

Tyr Tyr Leu Phe Gly Phe Ala Phe Ala Phe Gly Ser Pro Ser Asn Gly
          100          105          110

Phe Ile Gly Lys His Phe Phe Gly Leu Lys Asp Ile Pro Ser Ser Ser
          115          120          125

Tyr Asp Tyr Ser Tyr Phe Leu Tyr Gln Trp Ala Phe Ala Ile Ala Ala
          130          135          140

Ala Gly Ile Thr Ser Gly Ser Ile Ala Glu Arg Thr Gln Phe Val Ala
          145          150          155          160

Tyr Leu Ile Tyr Ser Ser Phe Leu Thr Gly Phe Val Tyr Pro Val Val
          165          170          175

Ser His Trp Phe Trp Ser Pro Asp Gly Trp Ala Ser Ala Phe Lys Ile
          180          185          190

Thr Asp Arg Leu Phe Ser Thr Gly Val Ile Asp Phe Ala Gly Ser Gly
          195          200          205

Val Val His Met Val Gly Gly Ile Ala Gly Leu Trp Gly Ala Leu Ile
          210          215          220

Glu Gly Pro Arg Met Gly Arg Phe Asp His Ala Gly Arg Ala Val Ala
          225          230          235          240

Leu Arg Gly His Ser Ala Ser Leu Val Val Leu Gly Thr Phe Leu Leu
          245          250          255

Trp Phe Gly Trp Tyr Gly Phe Asn Pro Gly Ser Phe Asn Lys Ile Leu
          260          265          270
  
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Leu Thr Tyr Gly Asn Ser Gly Asn Tyr Tyr Gly Gln Trp Ser Ala Val
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 Gly Arg Thr Ala Val Thr Thr Thr Leu Ala Gly Ser Thr Ala Ala Leu
 290 295 300
 Thr Thr Leu Phe Gly Lys Arg Val Ile Ser Gly His Trp Asn Val Thr
 305 310 315 320
 Asp Val Cys Asn Gly Leu Leu Gly Gly Phe Ala Ala Ile Thr Ala Gly
 325 330 335
 Cys Ser Val Val Glu Pro Trp Ala Ala Ile Val Cys Gly Phe Val Ala
 340 345 350
 Ser Ile Val Leu Ile Ala Cys Asn Lys Leu Ala Glu Lys Val Lys Phe
 355 360 365
 Asp Asp Pro Leu Glu Ala Ala Gln Leu His Gly Gly Cys Gly Thr Trp
 370 375 380
 Gly Val Ile Phe Thr Ala Leu Phe Ala Lys Lys Glu Tyr Val Lys Glu
 385 390 395 400
 Val Tyr Gly Leu Gly Arg Ala His Gly Leu Leu Met Gly Gly Gly Gly
 405 410 415
 Lys Leu Leu Ala Ala His Val Ile Gln Ile Leu Val Ile Ala Gly Trp
 420 425 430
 Val Ser Ala Thr Met Gly Pro Leu Phe Trp Gly Leu Asn Lys Leu Lys
 435 440 445
 Leu Leu Arg Ile Ser Ser Glu Asp Glu Leu Ala Gly Met Asp Met Thr
 450 455 460
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 Thr Thr Asp Glu
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<210> 5
 <211> 1991
 <212> DNA
 <213> Triticum aestivum

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<210> 6
<211> 494
<212> PRT
<213> Triticum aestivum

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      20             25             30

Ser Ala Val Asp Ser Thr Tyr Leu Leu Phe Ser Ala Tyr Leu Val Phe
  35             40             45

Ala Met Gln Leu Gly Phe Ala Met Leu Cys Ala Gly Ser Val Arg Ala
  50             55             60

Lys Asn Thr Met Asn Ile Met Leu Thr Asn Val Leu Asp Ala Ala Ala
  65             70             75             80

Gly Ala Leu Phe Tyr Tyr Leu Phe Gly Phe Ala Phe Ala Phe Gly Thr
      85             90             95

Pro Ser Asn Gly Phe Ile Gly Lys His Phe Phe Gly Leu Lys Asp Met
  100            105            110

Pro Gln Thr Gly Phe Asp Tyr Ser Phe Phe Leu Phe Gln Trp Ala Phe
  115            120            125

Ala Ile Ala Ala Ala Gly Ile Thr Ser Gly Ser Ile Ala Glu Arg Thr
  130            135            140

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Gln Phe Val Ala Tyr Leu Ile Tyr Ser Ala Phe Leu Thr Gly Phe Val
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 Tyr Pro Val Val Ser His Trp Ile Trp Ser Val Asp Gly Trp Ala Ser
 165 170 175
 Ala Ala Arg Thr Ser Gly Pro Leu Leu Phe Lys Ser Gly Val Ile Asp
 180 185 190
 Phe Ala Gly Ser Gly Val Val His Met Val Gly Gly Ile Ala Gly Phe
 195 200 205
 Trp Gly Ala Leu Ile Glu Gly Pro Arg Ile Gly Arg Phe Asp His Ala
 210 215 220
 Gly Arg Ser Val Ala Leu Lys Gly His Ser Ala Ser Leu Val Val Leu
 225 230 235 240
 Gly Thr Phe Leu Leu Trp Phe Gly Trp Tyr Gly Phe Asn Pro Gly Ser
 245 250 255
 Phe Val Thr Ile Leu Lys Ser Tyr Gly Pro Pro Gly Ser Ile Asn Gly
 260 265 270
 Gln Trp Ser Gly Val Gly Arg Thr Ala Val Thr Thr Thr Leu Ala Gly
 275 280 285
 Ser Val Ala Ala Leu Thr Thr Leu Phe Gly Lys Arg Leu Gln Thr Gly
 290 295 300
 His Trp Asn Val Val Asp Val Cys Asn Gly Leu Leu Gly Gly Phe Ala
 305 310 315 320
 Ala Ile Thr Ala Gly Cys Ser Val Val Asp Pro Trp Ala Ala Val Ile
 325 330 335
 Cys Gly Phe Val Ser Ala Trp Val Leu Ile Gly Leu Asn Ala Leu Ala
 340 345 350
 Gly Arg Leu Lys Tyr Asp Asp Pro Leu Glu Ala Ala Gln Leu His Gly
 355 360 365
 Gly Cys Gly Ala Trp Gly Ile Ile Phe Thr Ala Leu Phe Ala Lys Lys
 370 375 380
 Gln Tyr Val Glu Glu Ile Tyr Gly Ala Gly Arg Pro Tyr Gly Leu Phe
 385 390 395 400
 Leu Gly Gly Gly Gly Arg Leu Leu Ala Ala His Ile Val Gln Ile Leu
 405 410 415
 Val Ile Ala Gly Phe Val Ser Cys Thr Met Gly Pro Leu Phe Leu Ala
 420 425 430
 Leu Lys Lys Leu Gly Leu Leu Arg Ile Ser Ala Glu Asp Glu Met Ala
 435 440 445
 Gly Met Asp Leu Thr Arg His Gly Gly Phe Ala Tyr Val Tyr His Asp
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Asp Asp Glu His Asp Lys Ser Val Gly Gly Phe Met Leu Arg Ser Ala
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 <213> Zea mays

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 <211> 63
 <212> PRT
 <213> Zea mays

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Gln Ser Phe Pro Gly Leu Val Val Leu Tyr Gly Gly Val Val Lys Lys
 35 40 45

Lys Trp Ala Val Asn Ser Ala Phe Met Ala Leu Tyr Ala Phe Ala
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 <212> DNA
 <213> Oryza sativa

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<210> 10
 <211> 497
 <212> PRT
 <213> Oryza sativa

<400> 10

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		20					25						30		

Ala Thr Phe Val Gly Leu Gln Ser Met Pro Gly Leu Val Val Leu Tyr
35 40 45

Gly Ser Ile Val Lys Lys Lys Trp Ala Val Asn Ser Ala Phe Met Ala
50 55 60

Leu Tyr Ala Tyr Ala Ser Thr Leu Ile Val Trp Val Leu Val Gly Phe
65 70 75 80

Arg Met Ala Phe Gly Asp Arg Leu Leu Pro Phe Trp Gly Lys Ala Gly
85 90 95

Ala Ala Leu Thr Glu Gly Phe Leu Val Ala Arg Ala Ser Val Pro Ala
100 105 110

Thr Ala His Tyr Gly Lys Asp Gly Ala Leu Glu Ser Pro Arg Thr Glu
115 120 125

Pro Phe Tyr Pro Glu Ala Ser Met Val Leu Phe Gln Phe Glu Leu Ala
130 135 140

Ala Ile Thr Leu Val Leu Leu Ala Gly Ser Leu Leu Gly Arg Met Asn
145 150 155 160

Ile Lys Ala Trp Met Ala Phe Thr Pro Leu Trp Leu Leu Phe Ser Tyr
165 170 175

Thr Val Cys Ala Phe Ser Leu Trp Gly Gly Gly Phe Leu Tyr Gln Trp
180 185 190

Gly Val Ile Asp Tyr Ser Gly Gly Tyr Val Ile His Leu Ser Ser Gly
195 200 205

Ile Ala Gly Phe Thr Ala Ala Tyr Trp Val Gly Pro Arg Leu Lys Ser
210 215 220

Asp Arg Glu Arg Phe Ser Pro Asn Asn Ile Leu Leu Met Ile Ala Gly
225 230 235 240

Gly Gly Leu Leu Trp Leu Gly Trp Ala Gly Phe Asn Gly Gly Ala Pro
245 250 255

Tyr Ala Pro Asn Ile Thr Ala Ser Ile Ala Val Leu Asn Thr Asn Val
260 265 270

Ser Ala Ala Ala Ser Leu Leu Thr Trp Thr Cys Leu Asp Val Ile Phe
275 280 285

Phe Gly Lys Pro Ser Val Ile Gly Ala Val Gln Gly Met Met Thr Gly
290 295 300

Leu Val Cys Ile Thr Pro Gly Ala Gly Leu Val His Thr Trp Ala Ala
305 310 315 320

Ile Leu Met Gly Ile Cys Gly Gly Ser Leu Pro Trp Phe Ser Met Met
325 330 335

Ile Leu His Lys Arg Ser Ala Leu Leu Gln Lys Val Asp Asp Thr Leu
340 345 350

Ala Val Phe His Thr His Ala Val Ala Gly Leu Leu Gly Gly Phe Leu
355 360 365

Thr Gly Leu Phe Ala Leu Pro Asp Leu Thr Ala Val His Thr His Ile
370 375 380

Pro Gly Ala Arg Gly Ala Phe Tyr Gly Gly Gly Ile Ala Gln Val Gly
385 390 395 400

Lys Gln Ile Ala Gly Ala Leu Phe Val Val Val Trp Asn Val Val Ala
405 410 415

Thr Thr Val Ile Leu Leu Gly Val Gly Leu Val Val Pro Leu Arg Met
420 425 430

Pro Asp Glu Gln Leu Lys Ile Gly Asp Asp Ala Ala His Gly Glu Glu
435 440 445

Ala Tyr Ala Leu Trp Gly Asp Gly Glu Arg Phe Asp Val Thr Arg His
450 455 460

Glu Gly Ala Arg Gly Gly Ala Trp Gly Ala Ala Val Val Asp Glu Ala
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Met Asp His Arg Leu Ala Gly Met Gly Ala Arg Gly Val Thr Ile Gln
485 490 495

Leu

<210> 11
<211> 1961
<212> DNA
<213> Glycine max

<400> 11

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gcagaaccag	ccctttgtag	acttctattg	ccagtaacaa	attcaagggg	tgcatcttat	1380

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<210> 12
<211> 486
<212> PRT
<213> Glycine max

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<400> 12
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Trp Leu Asn Lys Gly Asp Asn Ala Trp Gln Leu Thr Ala Ala Thr Leu
      20              25              30

Val Gly Leu Gln Ser Met Pro Gly Leu Val Ile Leu Tyr Ala Ser Ile
      35              40              45

Val Lys Lys Lys Trp Ala Val Asn Ser Ala Phe Met Ala Leu Tyr Ala
      50              55              60

Phe Ala Ala Val Leu Ile Cys Trp Val Leu Val Cys Tyr Arg Met Ala
      65              70              75              80

Phe Gly Glu Glu Leu Phe Pro Phe Trp Gly Lys Gly Ala Pro Ala Leu
      85              90              95

Gly Gln Lys Phe Leu Thr Lys Arg Ala Ile Val Ile Glu Thr Ile His
      100             105             110

His Phe Asp Asn Gly Thr Val Glu Ser Pro Pro Glu Glu Pro Phe Tyr
      115             120             125

Pro Met Ala Ser Leu Val Tyr Phe Gln Phe Thr Phe Ala Ala Ile Thr
      130             135             140

Leu Ile Leu Leu Ala Gly Ser Val Leu Gly Arg Met Asn Ile Lys Ala
      145             150             155             160

Trp Met Ala Phe Val Pro Leu Trp Leu Ile Phe Ser Tyr Thr Val Gly
      165             170             175

Ala Phe Ser Leu Trp Gly Gly Gly Phe Leu Tyr Gln Trp Gly Val Ile
      180             185             190

Asp Tyr Ser Gly Gly Tyr Val Ile His Leu Ser Ser Gly Ile Ala Gly
      195             200             205

Phe Thr Ala Ala Tyr Trp Val Gly Pro Arg Leu Lys Ser Asp Arg Glu
      210             215             220

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Arg Phe Pro Pro Asn Asn Val Leu Leu Met Leu Ala Gly Ala Gly Leu
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 Asn Ile Ala Ser Ser Ile Ala Val Leu Asn Thr Asn Ile Cys Ala Ala
 260 265 270
 Thr Ser Leu Leu Val Trp Thr Thr Leu Asp Val Ile Phe Phe Gly Lys
 275 280 285
 Pro Ser Val Ile Gly Ala Val Gln Gly Met Met Thr Gly Leu Val Cys
 290 295 300
 Ile Thr Pro Gly Ala Gly Leu Val Gln Ser Trp Ala Ala Ile Val Met
 305 310 315 320
 Gly Ile Leu Ser Gly Ser Ile Pro Trp Val Thr Met Met Ile Leu His
 325 330 335
 Lys Lys Ser Thr Leu Leu Gln Lys Val Asp Asp Thr Leu Gly Val Phe
 340 345 350
 His Thr His Ala Val Ala Gly Leu Leu Gly Gly Leu Leu Thr Gly Leu
 355 360 365
 Leu Ala Glu Pro Ala Leu Cys Arg Leu Leu Leu Pro Val Thr Asn Ser
 370 375 380
 Arg Gly Ala Phe Tyr Gly Gly Gly Gly Gly Val Gln Phe Phe Lys Gln
 385 390 395 400
 Leu Val Ala Ala Met Phe Val Ile Gly Trp Asn Leu Val Ser Thr Thr
 405 410 415
 Ile Ile Leu Leu Val Ile Lys Leu Phe Ile Pro Leu Arg Met Pro Asp
 420 425 430
 Glu Gln Leu Glu Ile Gly Asp Asp Ala Val His Gly Glu Glu Ala Tyr
 435 440 445
 Ala Leu Trp Gly Asp Gly Glu Lys Tyr Asp Pro Thr Arg His Gly Ser
 450 455 460
 Leu Gln Ser Gly Asn Thr Thr Val Ser Pro Tyr Val Asn Gly Ala Arg
 465 470 475 480
 Gly Val Thr Ile Asn Leu
 485

<210> 13
 <211> 1656
 <212> DNA
 <213> Triticum aestivum

<400> 13
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<210> 14
<211> 470
<212> PRT
<213> Triticum aestivum

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<400> 14
Met Ser Val Pro Val Ala Tyr Gln Gly Asn Thr Ser Ala Ala Val Ala
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Asp Trp Leu Asn Lys Gly Asp Asn Ala Trp Gln Leu Thr Ala Ser Thr
      20                25                30

Leu Val Gly Leu Met Ser Val Pro Gly Met Val Val Leu Tyr Gly Gly
      35                40                45

Val Val Lys Lys Lys Trp Ala Val Asn Ser Ala Phe Met Ala Leu Tyr
      50                55                60

Ala Phe Ala Ala Val Trp Ile Cys Trp Val Val Trp Ala Tyr Asn Met
      65                70                75                80

Ser Phe Gly Glu Glu Leu Leu Pro Phe Trp Gly Lys Ala Gly Pro Ala
      85                90                95

Leu Asp Gln Ala Phe Leu Val Gly Arg Ala Ser Leu Pro Ala Thr Ala
      100                105                110

His Tyr Arg Ala Asp Gly Thr Leu Glu Thr Ala Met Val Glu Pro Tyr
      115                120                125

Phe Pro Met Ala Thr Val Val Tyr Phe Gln Cys Val Phe Ala Ala Ile
      130                135                140

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Thr Leu Ile Leu Val Ala Gly Ser Leu Leu Gly Arg Met Ser Phe Leu
 145 150 155 160
 Ala Trp Met Leu Phe Val Pro Leu Trp Leu Thr Phe Ser Tyr Thr Val
 165 170 175
 Gly Ala Phe Ser Val Trp Gly Gly Gly Phe Leu Phe His Trp Gly Val
 180 185 190
 Ile Asp Tyr Cys Gly Gly Tyr Val Ile His Ile Pro Ala Gly Val Ala
 195 200 205
 Gly Phe Thr Ala Ala Tyr Trp Val Gly Pro Arg Thr Lys Lys Asp Arg
 210 215 220
 Glu Ser Phe Pro Pro Asn Asn Ile Leu Phe Ala Leu Thr Gly Ala Gly
 225 230 235 240
 Leu Leu Trp Met Gly Trp Ala Gly Phe Asn Gly Gly Gly Pro Tyr Ala
 245 250 255
 Ala Asn Val Asp Ser Ser Met Ala Ile Leu Asn Thr Asn Ile Cys Thr
 260 265 270
 Ala Ala Ser Leu Ile Val Trp Thr Cys Leu Asp Ala Val Phe Phe Lys
 275 280 285
 Lys Pro Ser Val Val Gly Ala Val Gln Ala Val Ile Thr Gly Leu Val
 290 295 300
 Cys Ile Thr Pro Gly Ala Gly Val Val Gln Gly Trp Ala Ala Leu Val
 305 310 315 320
 Met Gly Val Leu Ala Gly Ser Val Pro Trp Tyr Thr Met Met Val Leu
 325 330 335
 His Lys Arg Ser Lys Leu Leu Gln Arg Val Asp Asp Thr Leu Gly Val
 340 345 350
 Ile His Thr His Gly Val Ala Gly Leu Leu Gly Gly Val Leu Thr Gly
 355 360 365
 Leu Phe Ala Glu Pro Asn Leu Cys Asn Leu Phe Leu Pro Val Thr Asn
 370 375 380
 Ser Arg Gly Ala Phe Tyr Gly Gly Asn Gly Gly Ala Gln Leu Gly Lys
 385 390 395 400
 Gln Ile Ala Gly Ala Leu Phe Val Ile Gly Trp Asn Val Val Val Thr
 405 410 415
 Ser Ile Ile Cys Val Val Ile Arg Leu Val Val Pro Leu Arg Met Ser
 420 425 430
 Glu Glu Lys Leu Ala Ile Gly Asp Asp Ala Val His Gly Glu Glu Ala
 435 440 445
 Tyr Ala Leu Trp Gly Asp Gly Glu His Tyr Asp Asp Thr Lys His Gly
 450 455 460

Ala Ala Val Val Pro Val
465 470